Grid-Tie PV INVERTER

PV-5000W-HV

Installation & Operation Manual

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Safety Precautions

Before starting your journey, please read the following safety instructions carefully.

Risk of Electric Shock

Alternating Current (AC) and Direct Current (DC) sources are connected to this device. To prevent risk of electric shock during maintenance or installation, please ensure that all AC and DC connections are disconnected.

Dangers!

High voltage inside inverter can cause Electric shock, even when inverter is not operating. Wait for 41 minute before opening it.

Warning!

If the PV inverter is used in a manner that is not covered by the scope of warranty, the protection provided by the PV inverter may be impaired.

Warning!

A high DC voltage exists inside the inverter once PV module is exposed to the Sun, even if PV inverter is not working.

PV modules ONLY!

Designed for PV and solar power conversion only; do not use it for other DC sources and conversion.

Grounding PV modules

To make sure personal and system safety, please connect frame of PV modules to earth. Please also refer to requirements of local regulation.

Cautions!

Do not stay permanently at a distance of less than 30 cm to the inverter. Inverter generates electromagnetic radiation could be harmful in such a close range.

Hot Surface

Some metallic parts of enclosure may be hot during operation.

Recycle

Do not throw this electronic device into the trash when discarding. To minimize pollution to environment, please handle as local regulations.

Contact Information

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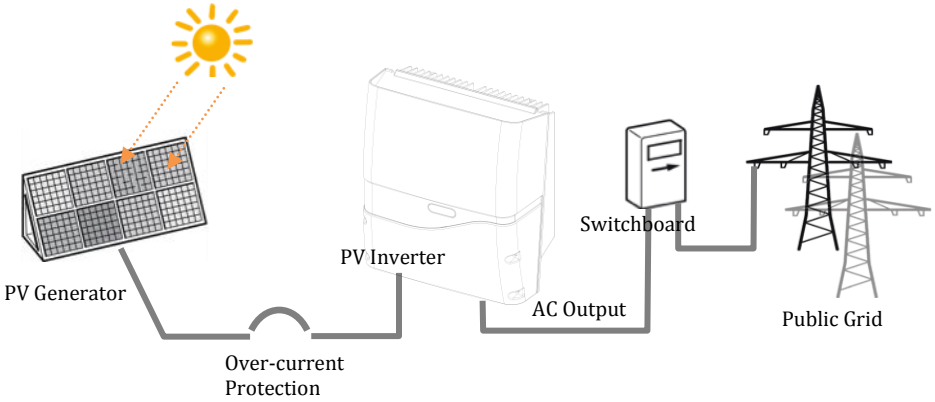
contact_pv@apd.com.tw

Warranty Information

Warranty or liability will be void if damage caused by any, but not limited to the following:

1. Unauthorized opening of the unit
2. Installation faults such as improper environment, wiring and application
3. Working conditions beyond the unit specifications
4. Improper operation of the unit
5. Violation of safety instructions inside this manual
6. Damage during transportation
7. Any internal modification
8. Replacing or installation of unauthorized software
9. Unforeseen calamity or force majeure

PV System



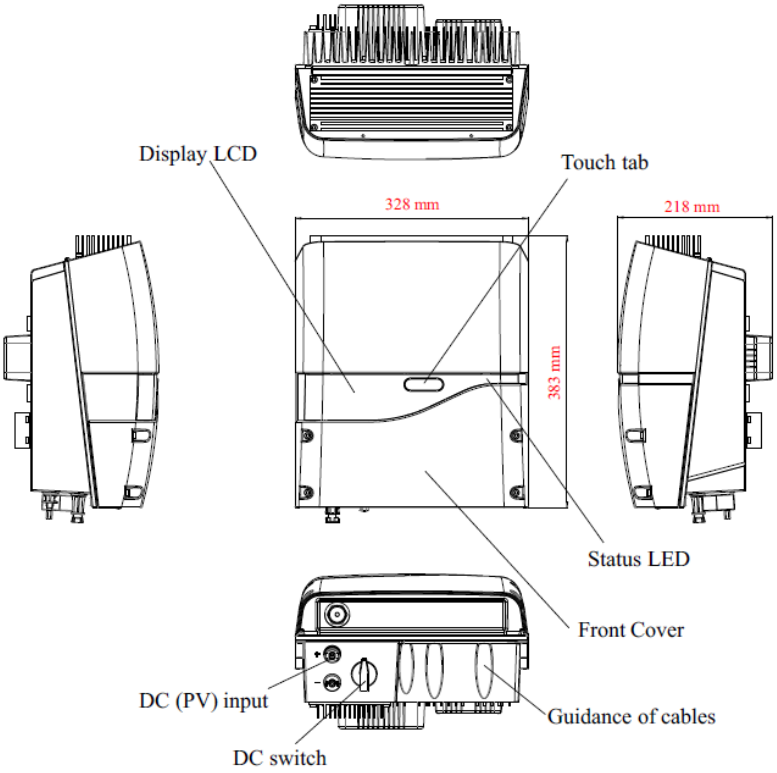
A typical PV system contains:

1. PV Generator (Panel): Receive sunlight and convert it into electricity
2. Over-current Protection: A device such as breaker or fuse for DC over-current protection
3. PV Inverter (with DC switch): Converts DC power from PV panels to AC output
4. Switchboard: Connection from utility to inverter
5. Public grid: Provides utility

Product Overview

Outline & Dimensions

PV-5000W-H V



Specification Label

PrimeVOLT

Model : PV-5000W-HV

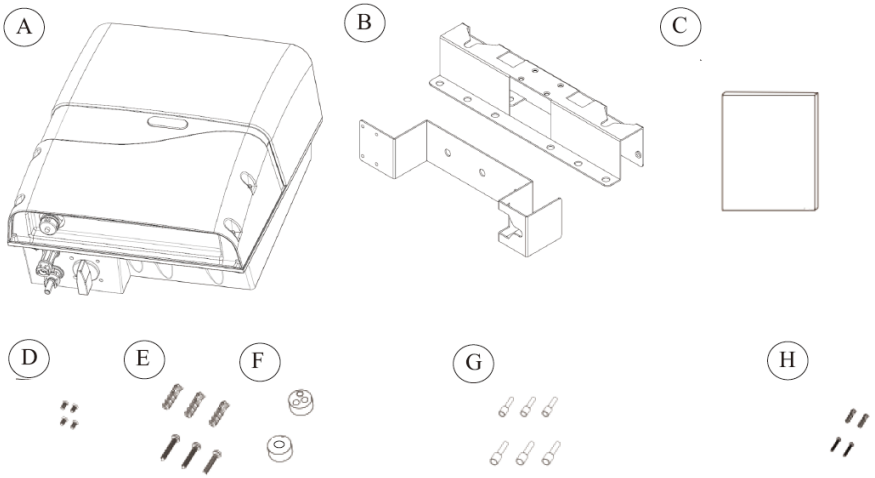
⎓	$V_{max.}$ PV	980V
	I_{SC} PV	15A
	MPPT working range	180 ~ 980V
	MPPT operating range (full load)	550 ~ 800V
	$I_{DC\ max.}$	10A
~	Rated Voltage	220 / 230 / 240V
	Rated Frequency	50 / 60 Hz
	Rated Current	22.7 / 21.7(20*) / 20.8A
	Rated Power	5000W(4600W*)
	S_E max.	5000VA(4600VA*)
Protective class		Class I
Degree of protection		IP 65
Power factor at rated power		0.99
Power factor range		± 0.8

*(VDE-AR-N 4105)

Made in Taiwan

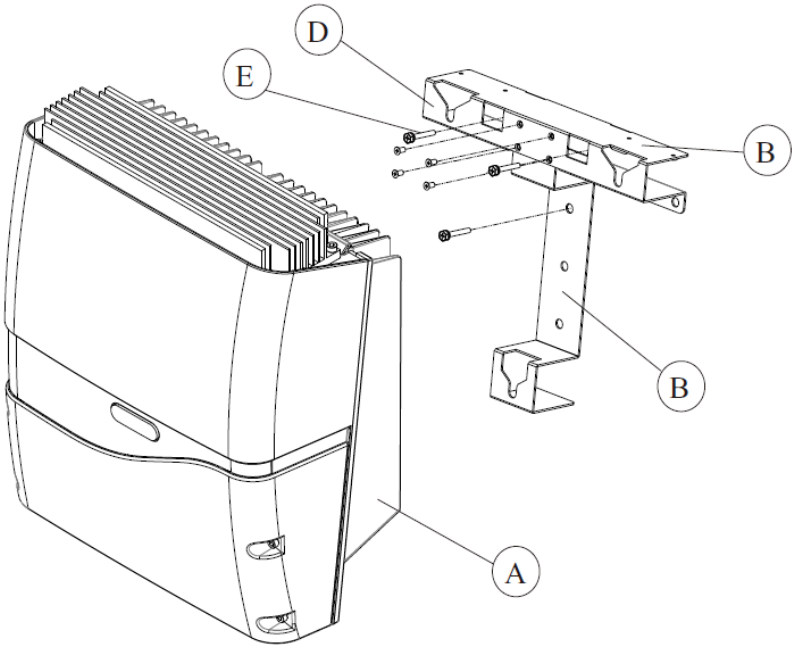
Installation

Inside the package



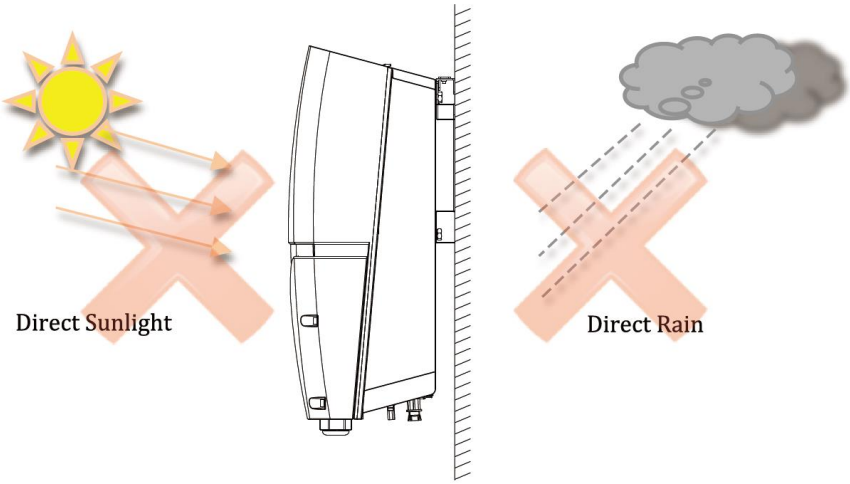
Item	Description
A	Inverter
B	Mounting Bracket Kit
C	User Manual
D	M4 Flat Screws X 4 for bracket
E	Plastic Anchors & Screws × 3, and Metal anchor × 3 to fix bracket on wall
F	Rubber Sealing for Ethernet, RS485, RCR and buzzer wires. M25 × 1, and M20 x 1
G	Insulated core end terminals: 4 mm^2x 3, 6 mm^2x 3
H	2 pairs of anchors and screws for buzzer installation (Optional)

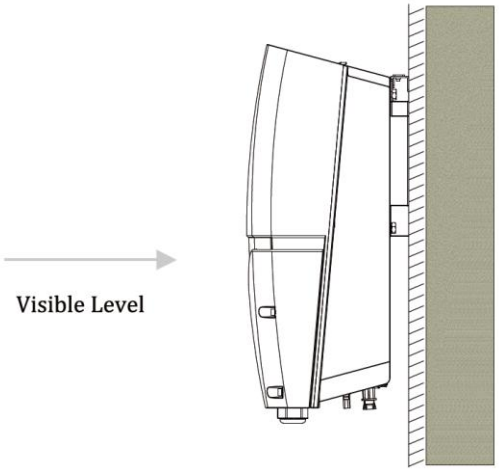
Assembly Chart



Choosing proper location

Avoid exposing the inverter in direct sunlight or with direct exposure to rain.

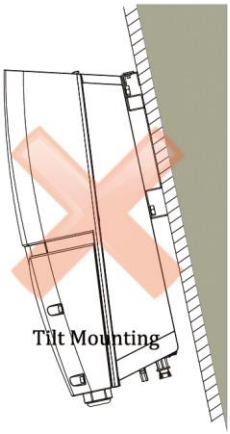


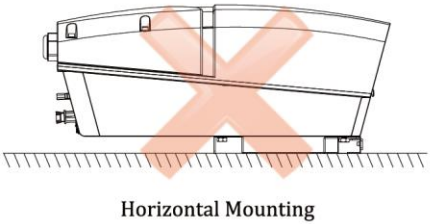


Mounting Surface	
Concrete	OK
Metal	OK
Stone	OK
Wood	Not Recommended

Mounting Properly

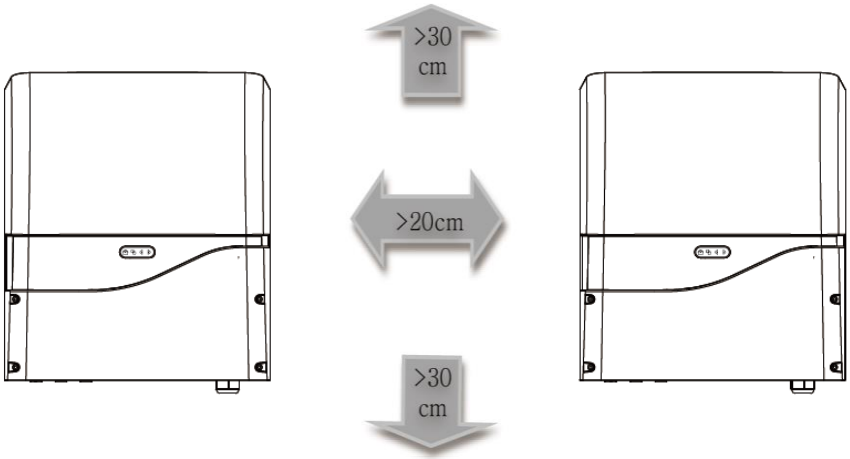
Direction





Keeping Clearance

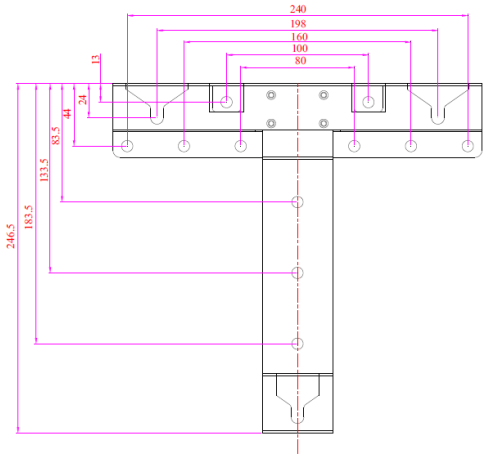
Mount the inverter in vertical direction; tilt or horizontal mounting should be avoided.



Mounting Procedure

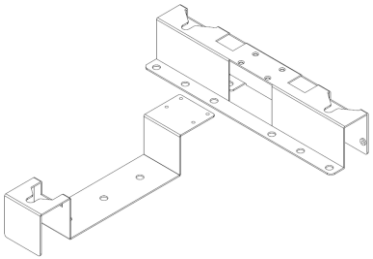
Dimension of bracket

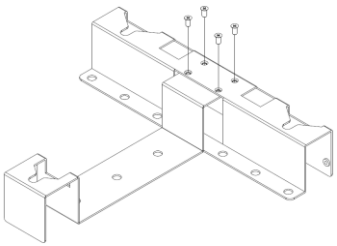
The bracket is used to support inverter on the wall. Before fixing it, refer to drilling location and dimensions below.



Assembly bracket

Before fixing, please assemble the bracket as below.

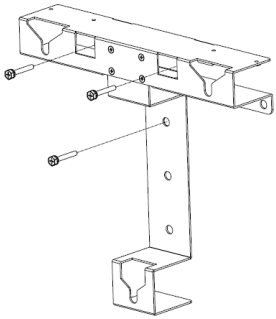




Mounting bracket

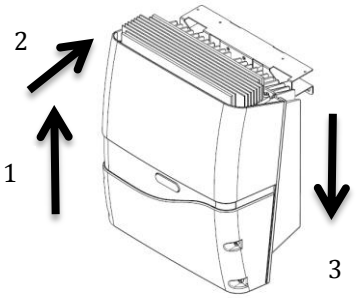
Place the assembled bracket where you want to. Drill at the correct positions, and fix bracket with the screws in the accessories.

For safe and firm mounting, fix at least 3 points in a triangle position.



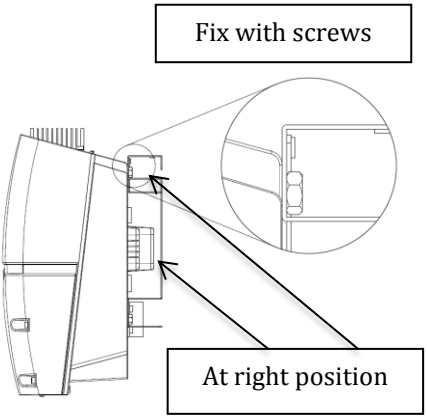
Attaching inverter

1. Lift inverter slightly higher than bracket; Make sure all fixing points on back are at the correct positions
2. Attach inverter on bracket
3. Hang inverter on bracket slowly



Checking

1. Check the 3 supporting points; make sure they are in their right positions
2. Lock caps are fixed with screws
3. Make sure inverter is well installed and secured on the wall



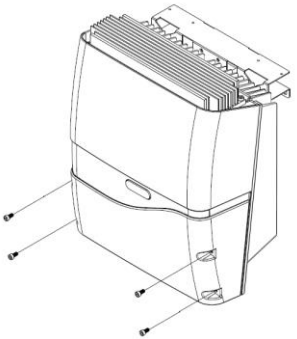
Wire Connections

Opening front cover

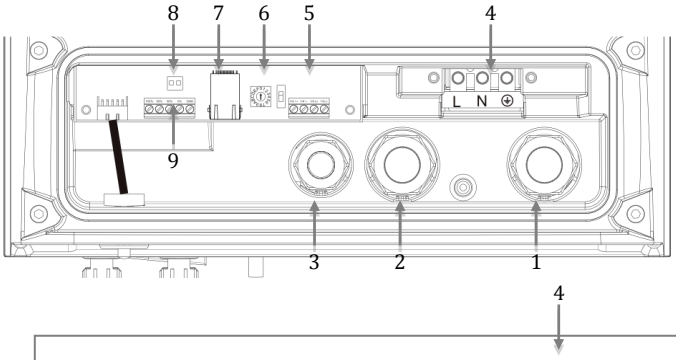
1. Remove 4 screws on cover as shown in right figure
2. Take off the cover

Overview of Connection Area

1. Cable Gland- AC cables
2. Cable Gland- Ethernet & RS485 cable
3. Cable Gland- Ripple Control receiver (RCR)
4. AC terminal block
5. RS485 terminal



6. RS485 address selector
7. RJ45 socket
8. External GFCI Buzzer connector (reserved)
9. Ripple Control receiver terminal



Independent AC circuit breaker needed

An independent circuit breaker shall comply with local safety standards and codes, between inverter and grid BEFORE connecting. Make sure inverter can be safely disconnected from the grid in all circumstances. Use 30A/250V(PV-5000-W-HV) circuit breaker.

AC wiring

1. Prepare cables as table below

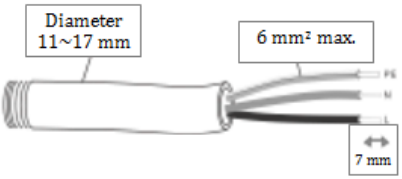
Cross Section (mm^2)	Maximum Length for 1% Loss (Meter)
	PV-5000W-HV
2.5	5
4	8
6	13
10	21

Table above is based on single-core copper wire with maximum temperature rise of 60°C. The actual wiring should be considered for following factors:

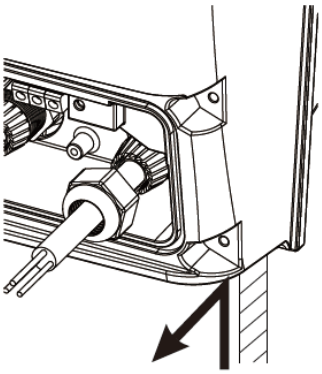
- Ambient temperature
- Wiring nearby
- Cooling

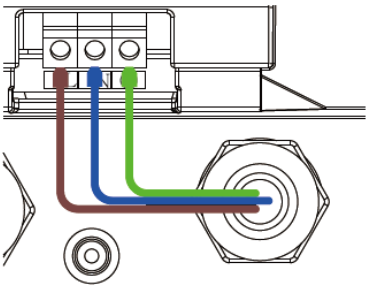
Please follow local standards if table above is different from.

2. Remove strip insulation ~ 7mm²
3. Remove sealing plug, twist off the AC cable gland
4. Insert AC cable through M25 rubber sealing and hole



5. Fix L (Line), N (Neutral) and PE (⏚) on terminal block
6. Twist cable gland to secure cable firmly





Note of selecting wire

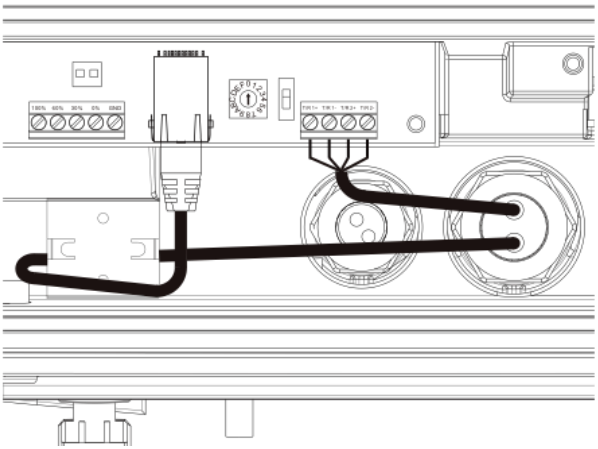
To safely secure cable on terminal block, please use solid wires. If stranded wires are used, apply core end terminals supplied in accessories.

Torque Information

The torque for AC terminal is between 0.6 ~0.8 Nm.

RS485, RJ45 and other connections

1. Remove sealing plug, twist off the cable gland for RS485
2. Insert wires through bottom guidance, and hole of rubber sealing (M25)
3. Refer to RS485 section for proper connections
4. Connect RJ45 as figure below with the core bead
5. Twist related cable glands to secure cables firmly



Connect GFCI Buzzer & RCR (Optional)

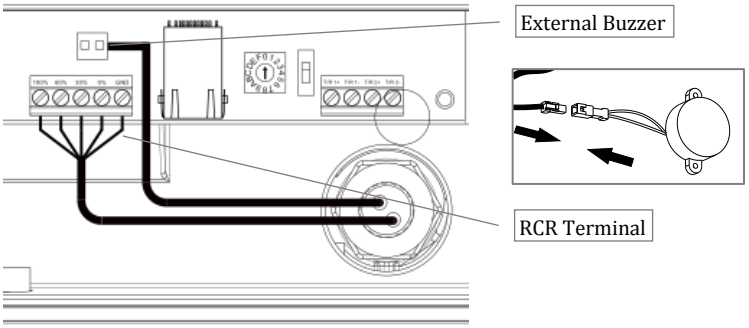
The buzzer is used to notice user while internal GFCI (Ground Fault Current Interrupter, also known as RCMU, Residual Current Monitoring Unit) is active. To install, please

1. Insert cord through the nut and connect to socket on inverter as figure below
2. Attach and fix the buzzer on an *indoor* surface such as wall
3. Connect buzzer with extension cord
4. If the length of cord is not enough, please cut it and extend by similar cord to the length you need

Place the buzzer where you can hear
The buzzer will notice you in case of ground current fault. Place it near you. Do not put into a cabinet or place far away.

Connected with Ripple Control Receiver Interface (Optional)

Please refer to figure above for wiring. For further information, please refer to section "Connecting to Ripple Control Receiver (RCR)".



Closing the Front Cover

After connecting all wires, please

1. Check all the connections again
2. Close front cover, tighten 4 screws
3. Check sealing in between cover and inverter

Applicable PV module type

Only non-grounding PV panel is applicable, user is suggested to consult with system installer for PV panel type selection.

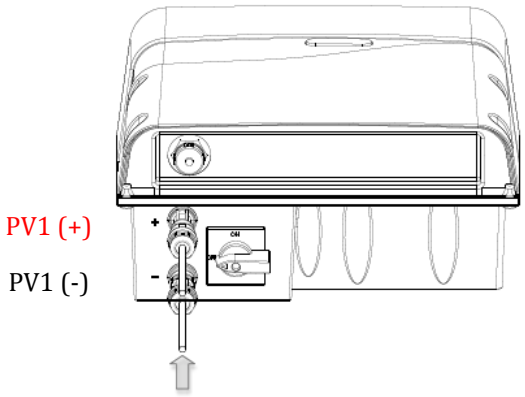
Warning
Require PV modules that have IEC 61730 class A rating.

DC (PV) wiring

1. DC Input Rating

Model / Rating	PV-5000W-HV
Max. Power (W)	5550
Max. DCV (V)	980
Max. Current (A)	10
String	1

2. Use either of following connectors
   1. Wieland PST40i1C (Preferred)
   2. Multi-Contact MC4 (PV-KST4 & PV-KBT4)
3. Select DC cables that can carry more than $I_{SC}PV$ (15A) in specification
4. Take off sealing plugs on connectors
5. Please plug in PV cables with recommended connectors to inverter as shown in figures
6. PV-5000W-HV



Danger, Electric Shock!
While working on DC wiring, ensure DC is completely turned off.

Polarity & voltage check

Before plugging in, make sure the polarity and voltage are correct. Incorrect connections could cause malfunction.

Over-Current protection at DC side

As long as DC cables can carry more than 15A, you may not need over current protection device in installation. However, installers still have to check again to comply local safety standards and codes.

Caution for parallel connections

To connect PV in parallel, do not wire more than 1 strings for each MPP tracker except over-current protection device exists.

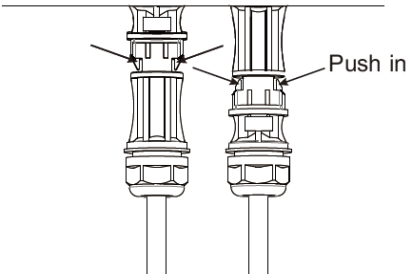
Keep the sealing plugs in safe place

Please keep those plugs in safe place. You may need to use them again in case removing DC connectors.

Unplugging PV

In case you need to disconnect the PV, follow the steps below:

1. **SWITCH OFF PV FIRST!**
2. Recommand to use Wieland assembling- / disconnecting tool Mounting tool PST (Art. No. 05.502.1753.0)
3. Push interlock to release per figure below
4. Pull off plugs



Be sure to SWITCH off PV

Direct pull-off DC plugs cause dangerous spark. Be sure to switch off PV in advance.

Ready to start

Check List

Before starting the inverter, check following items:

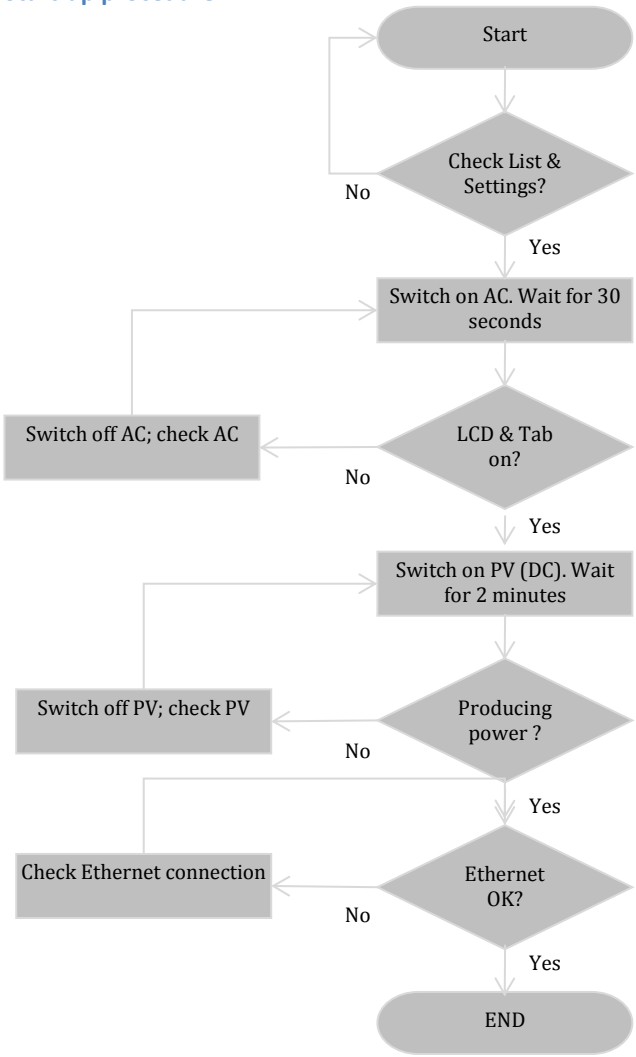
Item	Point of check	Checked?
Mounting	• Inverter is firmly mounted on the bracket • The 2 lock caps are secured • Lock is closed	
AC	• All wires are firmly fixed on terminal block • Polarity is correct • Protective Ground is available • Cable gland is tightened firmly	
RS485 RJ45 Ripple Control receiver	• All terminals are secured • Polarity is correct • Wires are tightened by cable gland • If it is not used, the sealing plug is on the gland	
Front cover	• All screws are secured tightly • The cover is firmly attached	
DC	• All plugs are firmly connected • Polarity is correct • Strings are not mixed-wiring (for multiple MPPT models)	

Changing the Grid-Connection and Operation Parameters

If you need to change grid-connected setting and/or operation parameters including voltage, frequency, power factor and power limitation ranges, please contact with authorized personnel with authorized “USB key” and procedure to do that.

After changing, to verify current setting, please swap to operation frame as indicated on page 31.

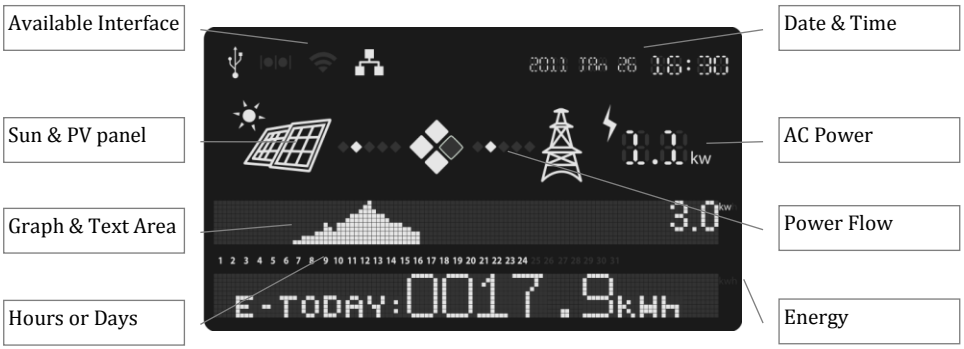
Start-up procedure



Operation

Overview

LCD


Available Interface
Date & Time
Sun & PV panel
AC Power
Graph & Text Area
Power Flow
Hours or Days
Energy
2011 JAn 26 16:30
1.1 kw
3.0 kw
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
E-TODAY:0017.9kWh

Icons on LCD

Icon	Description	Note
	USB. Appears while USB port is in use; flashing while accessing data	
	RS485. Appears when there are data transferring via RS485	
	Wi-Fi. Appears while Wi-Fi dongle is connected. Refer to manual of Wi-Fi dongle	
	Ethernet. Appears while Ethernet is connected	
	Sun. Appears during daytime	
	PV modules. Appears while PV is connected	
	Utility. Appears while utility power is available	
	Power feeding. Appears while inverter is feeding power	

Touch Tab

Touch Tab is used to change frame displayed on LCD

Icons on Tab

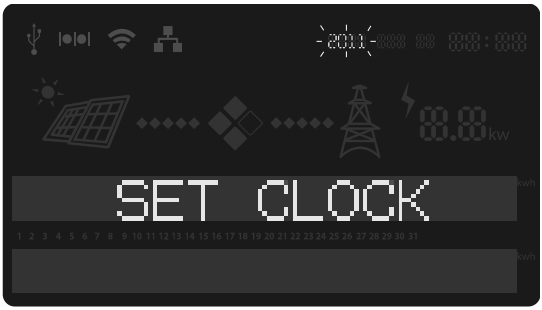
Icon	Description	Note
	Home. Switch back to H*ome* Screen	
	Toggle. Toggling between frames or information	
	Backward. Switch to previous daily (monthly) frame	
	Forward. Switch to next daily (monthly) frame	

Status LED

This LED indicates the operation status by its color. In normal operation, it is green; in abnormal conditions that inverter is not working, it will show red.

Clock Setting

During the first installation where the internal clock has not been set, below frame automatically prompts user to set date and time.



The flashing characters are the data to set. Use the touch tab to set.

While finished entering the new setting, tab to finish and confirm the new settings.

The following table describes tab functions.

Icon	Function	Note
	Confirm setting	
	Switch data views among *Year, Month, Day, Hour and Minute.*	
	Decrease number of settings	
	Increase number of settings	

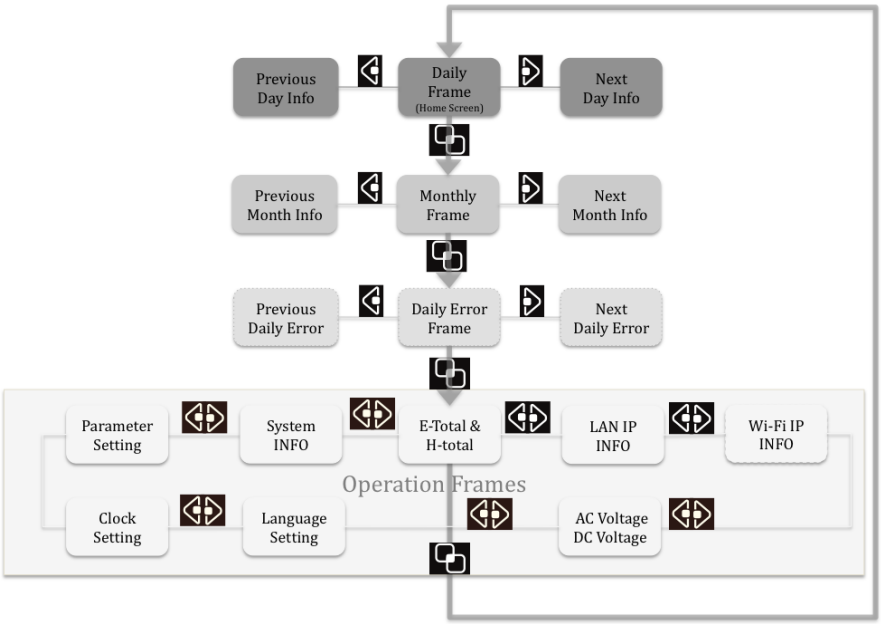
Incorrect Setting?
In case of incorrect setting, after inverter starts, switch to "Information frame" to set again

Keeping the Clock Setting
In case where the AC power is disconnected for more than 3.5 hours, the internal clock will change back to the default settings.

Clock Self-calibration
If inverter is connected to Internet, the internal clock can synchronize with a local time server automatically. To do this, you need to set the time zone and timeserver via internal web server. Please refer to later sections.

Frames

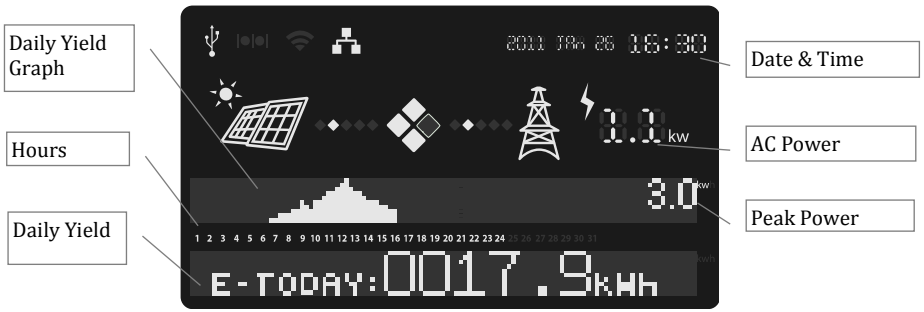
Operation Chart



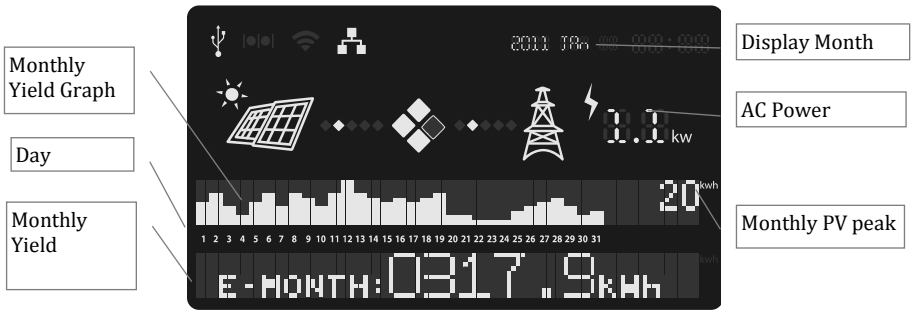
Note:
Tab will go back to Home (Daily) Frame
Daily Error Frame will not appear if there is no error in a day
LAN IP and/or Wi-Fi IP will not appear if there is no Ethernet and/or Wi-Fi connected

Home Screen & Daily Frame

The Home Screen (Daily Frame) shows the operation data of a day. The user can switch to different daily data by tapping FORWARD or BACKWORD. The date on the upper right side will change accordingly as well.



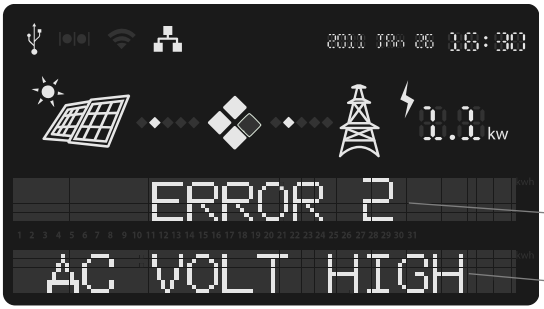
Monthly Frame



The monthly Frame shows the operation data of a month. The user can switch to view a different monthly data by tapping FORWARD or BACKWORD. The month (shown on upper-right side) will change accordingly in the mean time.

Daily Error Frame

This frame exists when there were errors of operation during a day.



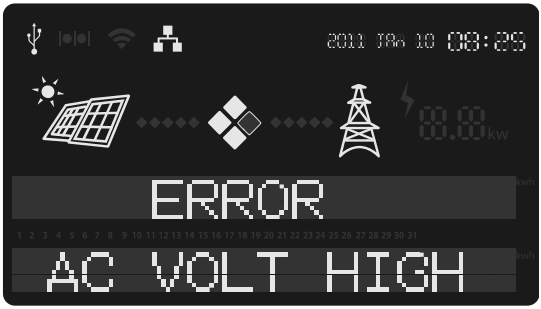
Operation Frame

This frame shows the operation information of inverter. There are five sub-frames as below:

1. E-Total & H-Total: Shows E-Total (Total accumulated Energy) in kWh and H-Total (Total operating hours of inverter) in hour
2. LAN and Wi-Fi IP addresses: IP address information assigned to the inverter
3. Clock setting: To set the clock of inverter. Refer to Clock Setting section
4. Language setting: To select the language displayed on LCD
5. Parameter Settings: Grid-Connection setting (VDE-AR-N 4105 or VDE 0126-1-1), 70% power limit status (ON or OFF) and PF setting (-0.8 ~ +0.8)
6. System Info: F/W version

Error Frame

An error is an abnormal situation in the functioning of the solar system. The frame shows up automatically after detection of error. The second text line indicates error type. Error types are defined as table below:



Error	Explanation
AC VOLT HIGH	Grid (AC) voltage is higher than the preset operation range
AC VOLT LOW	Grid (AC) voltage is lower than the preset operation range
AC FREQ HIGH	Grid frequency is higher than the preset operation range
AC FREQ LOW	Grid frequency is lower than the preset operation range
PV VOLT HIGH	PV voltage is higher than allowable voltage
PV ISUL LOW	The insulation resistance between either PV (+) or PV (-) to earth is lower 2M ohm
GFC HIGH	Ground Fault Current is higher than specification
KEEP PV OFF	Internal capacitor short, user has to switch off PV immediately
FAN FAILS	Internal or External fan is abnormal, need to be checked.
C1~ C7	Reserved for internal recording

Note for " KEEP PV OFF"

On reading this message, please switch off DC switch of PV immediately. DO NOT turn it on again for any reason. Call immediately for service.

Ground Fault Alarm

In addition to showing „GFC HIGH" on display, inverter will activate audiable alarm at optional buzzer and show message on web page while using a computer to monitor.

E-Series (Optional)

E-Series stands for Economic Series. It offers three solutions for customers who are seeking only basic logger functionalities and wishing to save a bit upon their own interests. The display screen of inverter is either not equipped or of some simple form. Generally, E-Series contains no functionalities described in Ch.7, select functionalities in Ch.8, and no functionalities in Ch.9.

LED Panel Only (Solution A)

This is the simplest of E-Series. There is no screen of any kind. The LED panel has three LED lights and one button. When fault occurs, one or two or three LED lights will be on blinking.

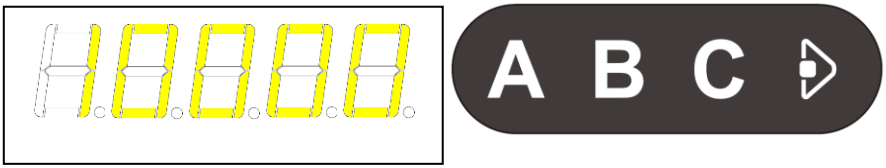
A	B	C	Error Message
OFF	OFF	OFF	All Normal
ON	OFF	OFF	DC Current Injection High
OFF	**ON**	OFF	Relay Failed
OFF	OFF	**ON**	DC Current Sensor Failed
A	B	C	Error Message
ON	**ON**	OFF	High Internal Temperature
ON	OFF	**ON**	GFCI Detection Failed
OFF	**ON**	**ON**	Bus Failed
ON	**ON**	**ON**	Fan Failed

Blink	**Blink**	**Blink**	Arcing Fault Detected (AFD)
Blink	OFF	OFF	Isolation Fault
Blink	**Blink**	OFF	Leakage Current High

Note：Blinking means LEDs on for 0.5 secs and off for 0.5 secs.

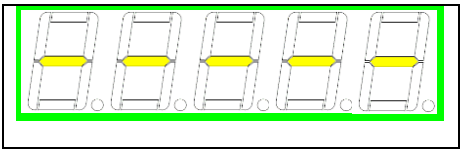
LED Panel + 7-Segment Display (Solution B)

This is the optimal selection of E-Series between features and price. There is a screen consisted of 7 segments in addition to the LED panel from Ch.10.1. The LED panel has three LED lights and one button. When fault occurs, one or two or three LED lights will be on blinking.



Stand-by Mode

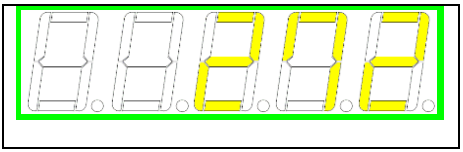
The 7-segment display screen enters stand-by mode when inverter receives no DC power coming from solar panels or internal communication fault occurs.



The 7-segment display screen exits stand-by mode and goes to countdown mode when inverter receives sufficient DC power from solar panels again or internal communication fault gets resolved.

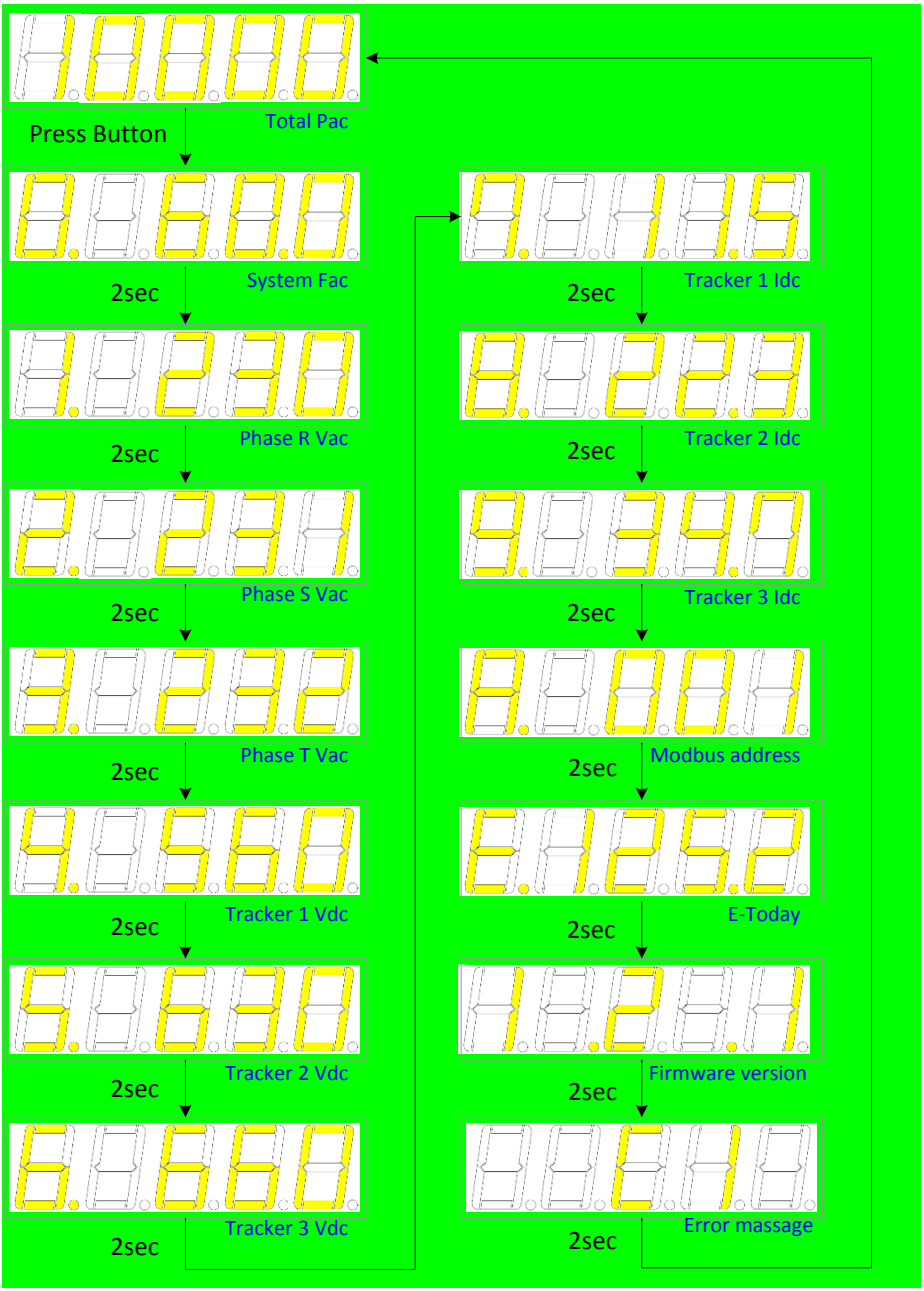
Countdown Mode

When inverter is ready to connect to electrical grid, the 7-segment display screen enters a 300-second countdown. This is to notify user that inverter will be starting generating power soon.



Regular Mode

When inverter has connected to electrical grid and started generating power, of the 7-segment display screen enters regular mode. This mode carries and shows inverter numbers and messages with a 2-second interval between. The starting on-screen information by default is the cumulative solar power that has been generated today (unit: W). Push the button on LED panel once to make all inverter information rolled on 7-segment display screen in a sequence. Refer to the flow chart below for the sequence and on-screen inverter information. If there has been no error occurred, error message is not included in the sequence and will not be shown on 7-segment display screen. When the roll of sequence has completed, the on-screen figure will return to cumulative solar power that has been generated today (unit: W), which is where the flow began from.


Total Pac
Press Button
System Fac
2sec
Phase R Vac
2sec
Phase S Vac
2sec
Phase T Vac
2sec
Tracker 1 Vdc
2sec
Tracker 2 Vdc
2sec
Tracker 3 Vdc
2sec
Tracker 1 Idc
2sec
Tracker 2 Idc
2sec
Tracker 3 Idc
2sec
Modbus address
2sec
E-Today
2sec
Firmware version
2sec
Error massage
2sec

Index	Indication	Unit
0.	Frequency of electrical grid	Hz
1.	Voltage of electrical grid phase R	V
2.	Voltage of electrical grid phase S	V
3.	Voltage of electrical grid phase T	V
4.	Input voltage of DC tracker 1	V
5.	Input voltage of DC tracker 2	V
6.	Input voltage of DC tracker 3	V
7.	Input current of DC tracker 1	A
8.	Input current of DC tracker 2	A
9.	Input current of DC tracker 3	A
A.	Designated network communication address	
E.	Cumulative power generated today (E-Today)	kWh

Error Messages

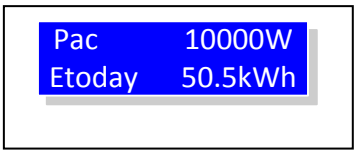
Error Message	Indication
KEEP PV OFF	Internal fault detected Please keep DC breaker of solar panels off
C1	High DC current detected
C2	Relay failed
C3	DC current sensor failed
C4	Internal temperature high
C5	GFCI detection failed
C6	Bus Failed
C7	Anti-islanding detection failed
FAN FAILS	Fan not working properly

Error Message	Indication
F1	Bus voltage low
F2	Bus voltage high
F3	CPU communication abnormal
F4	Mismatch of firmware version between CPUs
F5	EEPROM memory faulty
F6	Error on system consistency
F7	Over-current in inverter detected
F8	Slow start-up on Bus

Error Message	Indication
E1	Grid voltage over range
E2	Grid voltage below range
E3	Electrical grid not deteced
E4	Grid voltage over range
E5	Grid frequency below range
E6	DC voltage from PV higher than limit
E7	Check for insulation of solar panels failed
E8	Leakage current high

LED Panel + LCM Panel (Solution C)

This is the premium selection of E-Series. There is a LCM screen in addition to the LED panel from Ch.10.1. The LED panel has three LED lights and one button. When fault occurs, one or two or three LED lights will be on blinking.

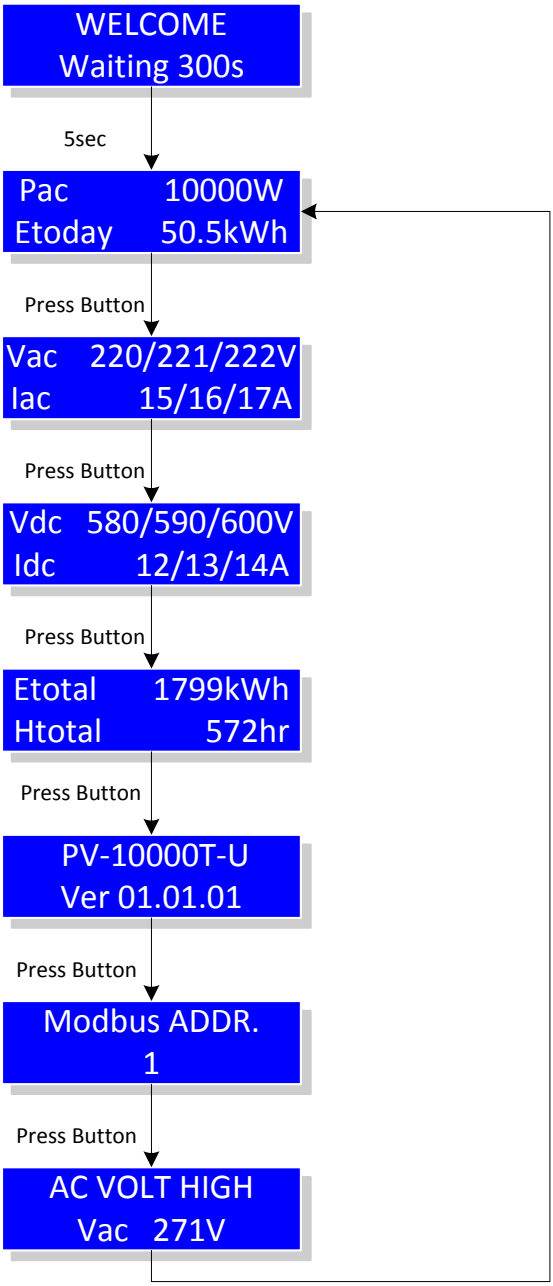


Welcome Mode

The LCM screen enters welcome mode and notify of a 300-second countdown when inverter receives sufficient DC power coming from solar panels. Inverter will connect to electrical grid and start generating power when the 300-second countdown has completed.

Regular Mode

When inverter has connected to electrical grid and started generating power, of the LCM screen enters regular mode. The starting on-screen information by default is the solar power being generated at the moment (unit: W) and cumulative solar power that has been generated today (unit: kWh). Push the button on LED panel to change information display frame. Refer to the following table and flow chart for the sequence and on-screen inverter information.


WELCOME
Waiting 300s
5sec
Pac 10000W
Etoday 50.5kWh
Press Button
Vac 220/221/222V
Iac 15/16/17A
Press Button
Vdc 580/590/600V
Idc 12/13/14A
Press Button
Etotal 1799kWh
Htotal 572hr
Press Button
PV-10000T-U
Ver 01.01.01
Press Button
Modbus ADDR.
1
Press Button
AC VOLT HIGH
Vac 271V

Error Mode

When inverter encounters an error, LCM screen enter error mode and an error message will be displayed on LCM screen continuously.

This error message will remain on-screen until user presses the button on LED panel to unlock and exit error mode. When exited, the LCM screen returns to regular mode and goes to the information frame displaying the solar power being generated at the moment (unit: W) and cumulative solar power that has been generated today (unit: kWh). The error message mentioned above will be recorded in Last ERROR information frame. Refer to the table below for interpretation of all inverter error messages.

Error Message	Indication
AC VOLT HIGH Vac XXX V	Grid voltage over range Measured voltage displayed
AC VOLT LOW Vac XXX V	Grid voltage below range Measured voltage displayed
AC FREQ HIGH fac XXX.X Hz	Grid frequency over range Measured frequency displayed
AC FREQ LOW fac XXX.X Hz	Grid frequency below range Measured frequency displayed
PV VOLT HIGH Vdc XXX V	Solar panel voltage over range Measured voltage displayed
PV ISUL LOW	Check for insulation of solar panels failed
Ground I high Ig XXX mA	Leakage current high Measured current displayed
ARC FAULT	High-voltage arcing observed within inverter

Error Message	Indication
KEEP PV OFF	Internal fault detected Please keep DC breaker of solar panels off
C1	High DC current detected
C2	Relay failed
C3	DC current sensor failed
C4	Internal temperature high
C5	GFCI detection failed
C6	Bus Failed
C7	Anti-islanding detection failed
FAN FAILS	Fan not working properly

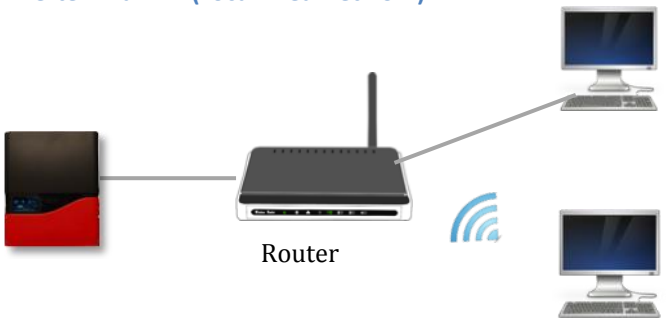
Error Message	Indication
F1	Bus voltage low
F2	Bus voltage high
F3	CPU communication abnormal
F4	Mismatch of firmware version between CPUs
F5	EEPROM memory faulty
F6	Error on system consistency
F7	Over-current in inverter detected
F8	Slow start-up on Bus

Last ERROR Information Frame

The inverter error that has occurred most recently is generally recorded by the Last error. When a new inverter error happens, the Last ERROR information frame will update to this new inverter error.

Network and Internet

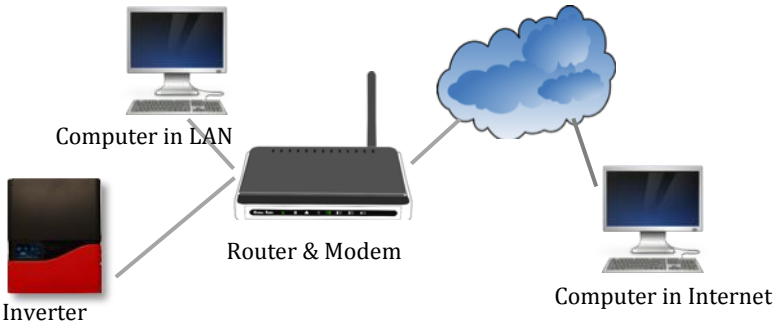
Accessing inverter in a LAN (Local Area Network)



Above figure is a typical connection in a LAN. Inverter and devices are connected to a router by Ethernet cable or Wi-Fi. Computer and device in the LAN can access inverter's data if you know inverter's IP address.

Usually, the router acting as a DHCP server assigns an IP to the inverter automatically. You can manually assign an IP to the inverter by setting router as well. In case IP is assigned, tap to "Operation Frame" to find it out.

Accessing inverter via Internet



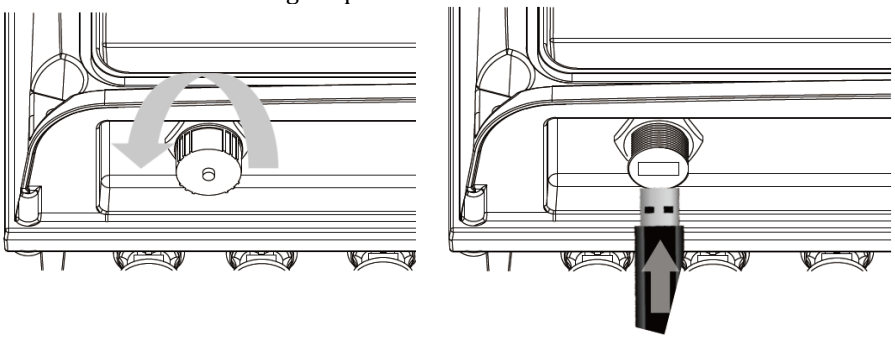
Above figure shows how to access the data via Internet. Similar to LAN, you can access the inverter by web browser. However, usually there is a firewall that will block direct access the LAN from Internet. To overcome this, you need to set up NAT (Network Address Translation) or Port Forwarding of the router. For detail information, refer to manual provided by router supplier.

Using USB

Plug in USB stick

To access inverter data, you can plug in a pre-formatted USB stick into port beneath the inverter. *The stick must be FAT or FAT32 formatted.*

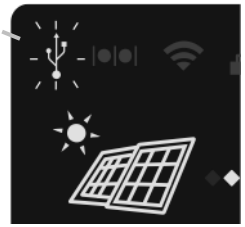
Remove the cap and plug in a USB stick. If inverter recognizes the device, the USB icon on LCD should light up.



Downloading data

After plugging in the USB, all data inside the inverter will be downloaded to the stick automatically. During download, USB icon is blinking.

USB icon is blinking during access



After downloading, while USB icon is steadily on, you can then safely unplug the stick. The data will be saved to the stick already.

Data Format

There will be 2 data files downloaded. The first one is for SQLite; the other is a CSV (Common Separation Value).

Notice of Firmware Upgrade

If the USB stick contains firmware software for an update, the inverter will not download data onto USB stick.

Firmware Upgrade

The inverter can be upgraded to the latest firmware version by USB and Internet. To do this, you need to have either the firmware in a USB stick or connect inverter to Internet. Please consult your local service for more detailed information; to update via Internet, please refer to "Settings" on page 48, enable AUTO FW Update item.

Setting PF and 70% power limit

Authorized person can set the PF and power limit. Please contact with your system installer.

Capacity of Memory

The internal memory can store up to 3-year length of data. Data older than 3 year will be replaced by latest date automatically.

Backup Data Periodically

Once data in the logger has been deleted, it can not be recovered. Therefore it's recommended to backup the data periodically if you wish to retain this information.

Browsing inverter WEB

Basics

After connecting inverter in a network, you can access data of the inverter by web browser such as Internet Explorer, Firefox and Safari. Follows below steps explore the web of the inverter:

1. Make sure you've connected inverter to a LAN either by Ethernet or Wi-Fi
2. Tap touch tab and switch to "Operation Frames" to check the IP address
3. Use a computer, open your web browser, key in the IP address at the address bar (Refer to figure below, the example here is 192.168.10.122)
4. Daily graph appears afterward

Overview

1. Display Tabs: There are 4 selections
    a. Day: The yield graph of a day
    b. Month: Bar Graph of a month. While moving cursor to a day, the corresponding yield of the day will appear automatically. Refer to picture below
    c. Logs: Event records of inverter. Events include activities and errors of inverter. Refer to picture below

Uhrzeit	Status	Meldung
2012/10/01 13:01:00	Information	F/W Download
2012/09/30 13:01:00	Information	F/W Download
2012/09/29 13:01:00	Information	F/W Download
2012/09/28 21:35:49	Information	System Started
2012/09/28 13:35:00	Information	AutoUpdate Firmware!
2012/09/28 13:01:00	Information	Check Firmware!
2012/09/27 15:10:17	Information	System reboot.

    d. Settings: Information and set-up of inverter
2. Inverter Status: Showing current operation status. During night and/or inverter is not working, the area is black. When an error or failure happens, it will prompt the related message
3. Information Boards: Includes power generation and system parameters. During night, while inverter is not working, the "system" data disappears
4. Forward/Backward Tabs: Move current display forward or backward

Settings

While switch to Settings, you will see below table.

Inverter Info.	PV-5000W-HV	**Date & Time**	Oct/1/2012 11:02:00
Voltage Range	194.0 ~ 264.0 V	**Frequency Range**	49.00 ~ 51.00 Hz
Grid Regulation	VDE-AR-N 4105	**PF**	1.00
70% Limit	OFF	**RCR Info.**	(Show)
IP Address	192.168.10.122	**Wi-Fi**	(Edit)
Auto FW Update	ON	**Language**	English

Feed-in Rate	0.33€	**Administration**	admin

For items you want to change, move the cursor onto and click it. You will be asked to input user name and password, then you can change the settings.

1. Inverter Info. : The name, serial number and F/W version
2. Date & Time: Clock of inverter. While click in, you can set time zone and automatically synchronization with time server
3. Voltage Range: Current settings of voltage range
4. Frequency Range: Current settings of frequency range
5. Grid Regulation: The grid regulation setting
6. PF: Power factor settings of inverter
7. 70% Limit: On or Off. Limitation of AC output power to 70% of PV power
8. RCR Info.: The **R**ipple **C**ontrol **R**eceiver settings information. Refer to section "RCR Setting Information"
9. IP address: The assigned IP address
10. Wi-Fi: Setting for connecting to Wi-Fi access point, includes:
    a. SSID
    b. Password: The key or password of your WLAN
11. Auto FW Update: Yes or No. Select "Yes" will enable automatically F/W update. Inverter will check latest F/W, download and update automatically. If "No" is selected, inverter will not check update from that time
12. Language: Language setting
13. Feed-in Rate: The feed-in rate. Graph will display your earnings according to the setting
14. Administration: Settings of user name and password. The default name is "admin"; the default password is "admin"

Some items can not be changed

Items 3 ~ 8 cannot be changed here. They needs authorized person with special program to set that.

Auto Wi-Fi encryption and authentication

This inverter can automatically select proper encryption and authentication. User does not have to key in.

RCR Setting Information

Once click on “Show” on right of RCR Info, current settings of RCR will appear as table below:

K1	K2	K3	K4	Active	Power
○	○	○	○	○	100%
○	○	○	◉	◉	0%
○	○	◉	○	◉	30%
○	○	◉	◉	○	75%
○	◉	○	○	◉	60%
○	◉	○		○	70%
○	◉	◉	○	○	10%
○	◉	◉	◉	○	50%
◉	○	○	○	◉	100%
◉	○	○	◉	○	20%
◉	○	◉	○	○	100%
◉	○	◉	◉	○	0%
◉	◉	○	○	○	60%
◉	◉	○	◉	○	70%
◉	◉	◉	○	○	20%
◉	◉	◉	◉	○	90%

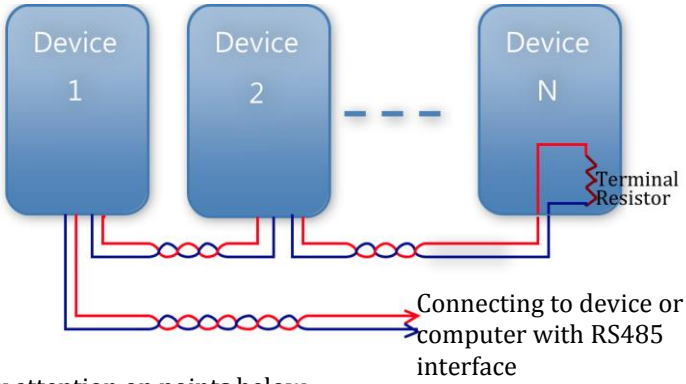
Signal Length	2 sec
Fallback Active	Yes
Fallback Time	10 min
Fallback Power	100%

1. K1~K4: The corresponding relays on RCR
2. Active: While selected, the related status of K1 ~K4 will be active
3. Power: The output power limit of the status
4. Signal Length: The minimum retaining time of a signal to activate power limit
5. Fallback: A "Fallback" is the working state that inverter will be after losing signal or receiving signal not defined in above K1~K4 table
6. Fallback Active: When selected, the fallback will happen after “Fallback Time”
7. Fallback Time: The period of “Fallback”
8. Fallback Power: The AC power limit of a fallback

RS485

About RS485

A typical RS485 connection is showed below.

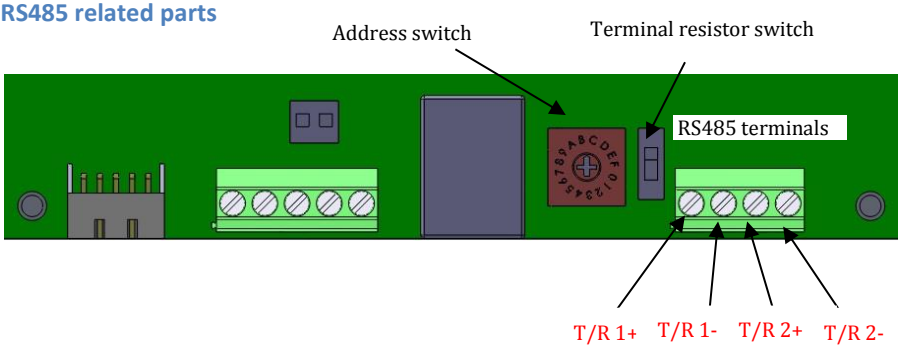


Pay attention on points below:

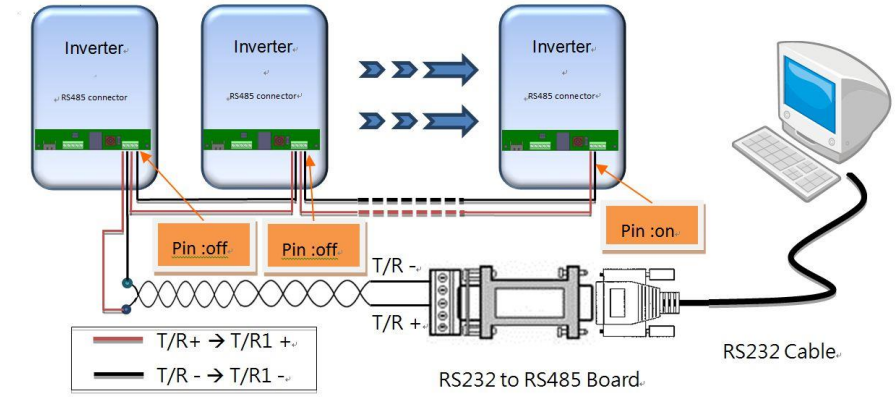
1. The wires between devices and computer are twisted
2. Maximum wire length is 1000m
3. The terminal device should have terminal resistor
4. Due to multiple connection, each device should be assigned an address so as to send/receive proper data

Connecting RS485

RS485 related parts



Wiring Diagram



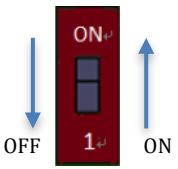
1. Connect T/R+ and T/R- on RS485 converter to T/R1+ and T/R1- on inverter respectively
2. Between inverters, please connect T/R2+ and T/R2- of current inverter to T/R1+ and T/R1- of next inverter
3. Set terminal resistor switch "ON" final inverter, others' are set as "OFF"

Setup Address

To do the setting, please use address rotary as right figure. For single inverter, set the position to "0"; for multiple inverters, set them to different positions without duplication. Since only 16 positions (0~F), the maximum number of inverters in RS485 bus is 16.

Setting the terminal resistor

As shown right, "ON" indicates resistor is added. ONLY the final inverter, this switch should be set to "ON". Others should be at "OFF"

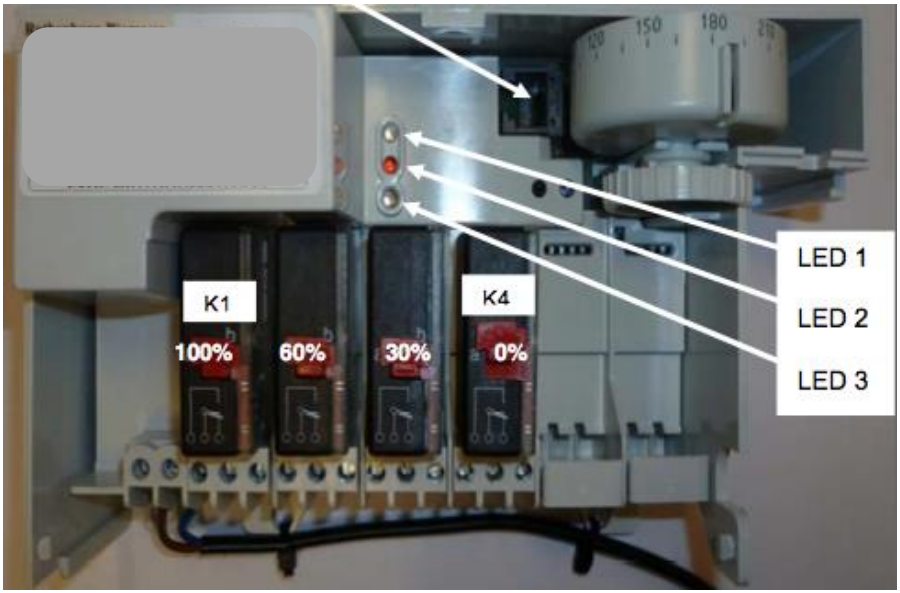


Attention

Incorrect setting could cause communication failure.

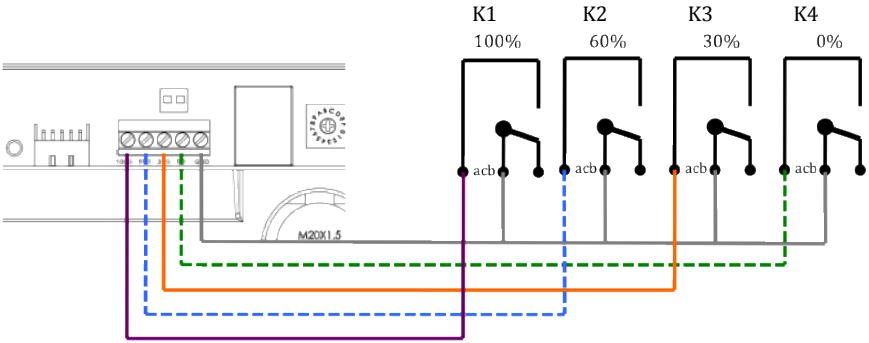
Connecting to Ripple Control Receiver (RCR)

An RCR receives control signals form Power Company. The inverters can be connected to RCR directly. Inverters can detect the action of RCR and adjust their output power to corresponding level. The typical connection terminals on an RCR are shown below.

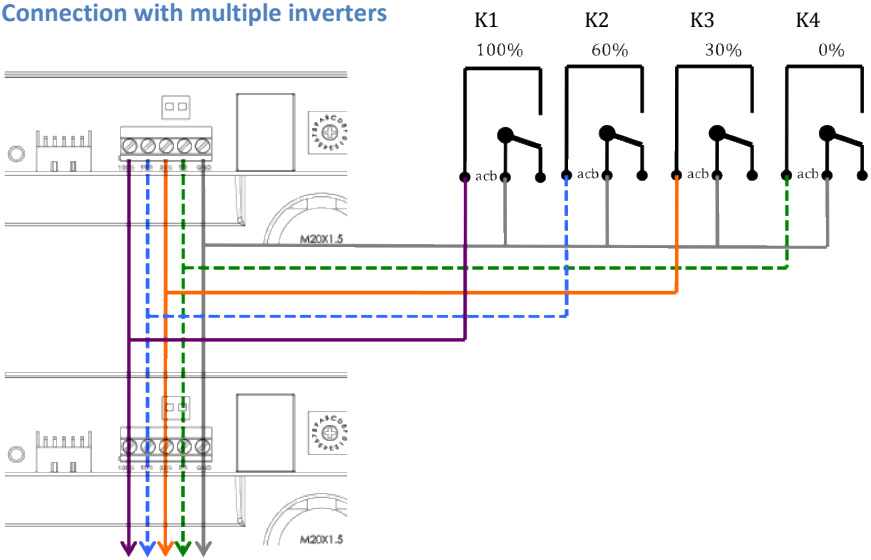


Connection with single inverter

While connecting a single inverter, please follow figures below.



Connection with multiple inverters



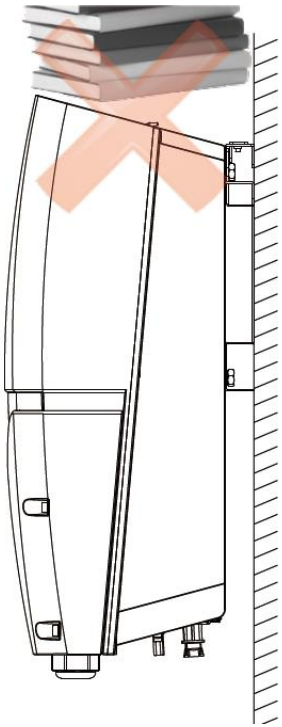
To other inverters

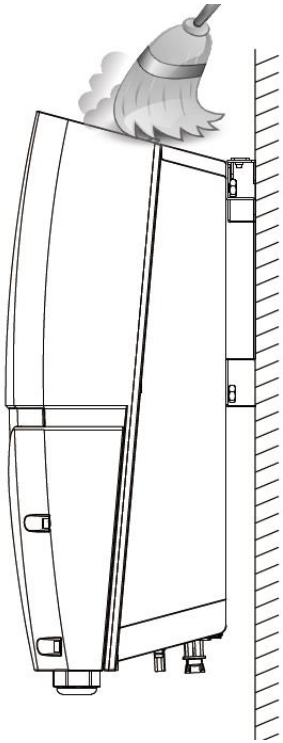
Maintenance

Normal Maintenance

Normally, this inverter does not require any special care during its lifetime. However, for best results, please follow below points:

1. Make sure no obstacle are placed on the top of inverter
2. Clean up any dust on inverter, especially over the heat sink on a regular basis
3. Check operation and status of inverter
4. Check all wiring and cables





Trouble Shooting

In case inverter detects any problem, it may display one of the situations in table below. Please follow the instruction to solve. If the problem is not solved, please contact your local service for further assistance.

Trouble	Treatment
No display or incorrect display	1. Check AC connection such as fuse, breaker and wiring. Be sure AC is connected to inverter properly 2. Switch off AC and switch on again
No generation *(No Error)*	1. Check PV connection and wiring 2. Check PV polarity 3. Check PV voltage 4. Wait for stronger sunlight
Error on display	Refer to error table in Error Frame section 1. Error other than "C#": Read related meaning and take suitable action 2. "C#" Error: Switch off the AC breaker than the DC. Then switch on the DC and then the AC again 3. If "C#" error continue, please contact with local service and tell he the "C#" error
Generated power is less than expected	1. Check module installation environment 2. Ensure inverter is not in direct sun light 3. Remove any objects on the inverter 4. Check its ambient temperature
Fan Fails	1. See whether there is any obstacle stocked in the fan 2. If fan still can not rotate, please call service and replace it as page

Specifications

Model	Unit	PV-5000W-HV
Input (DC)		
Max. Power	W	5550
MPPT Range	V	550 ~ 800
Working Range	V	180 ~ 980
Max. DC Voltage	V	980
Max. DC Current	A	10
MPP Tracker No.		1
Max. backfeed current to array	A	1
Output (AC)		
Nom. Power	W	5000
Max. Power	W	5000
Nominal Voltage	V	220/230/240
Voltage Range	V	184~264.5
Nominal Frequency	Hz	50/60
Power Factor		-0.8 ~ +0.8
Maximum Current	A	23.8
Inrush Current	A/mS	50/0.2
Max. O/P Fault Current	A/mS	50/0.2
Max. O/P Over-Current Protection	A	45
Efficiency		
Max. Efficiency	%	97.7
Euro- Eta	%	97.3
General		
Temp. Range	℃	-20 ~ 55
Temp. Full Power	℃	-20 ~ 45
Topology		Transformerless

Protection		IP65
Humidity	%	0~100%
Cooling		Convection
Protection Class		I
Environment Cat.		Pollution Degree III
Overvoltage Cat.		DC input: II, AC input: III
Amplitude	M	<2000
Features		
LCD		Icon Graphic Display
RS485		Standard, half-duplex
Power Reducing		Yes, by USB port with authorized software
Wi-Fi		Optional
Date Logging		Yes, 3 year
Web Server		Yes. Use to monitor power graph, adjust inverter parameters and settings
Clock Sync		Automatically sync with time server
Mechanical		
W x H x D	mm	330x383x218
Weight	kg	15
Input Pairs		1
DC switch		Yes
Compliance		
Grid Monitoring[1]		VDE-AR-N 4105, VDE0126-1-1/A1
Safety		IEC 62109-1, 62109-2
EMC Emission		EN61000-6-4, EN61000-3-11, EN61000-3-12
EMC Immunity		EN61000-6-2

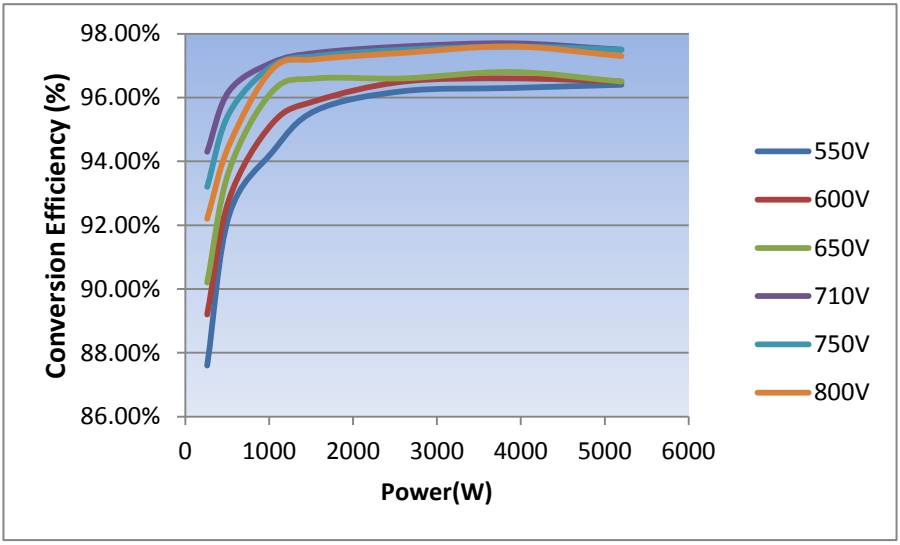
Note: Specifications are subject to change without prior notice

[1] To select the setting, refer to "Change the Grid-Connected and Operation Parameters"

Addendum

Efficiency Chart

PV-5000W-HV



PV-5000W-HV